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INVENTION DISCLOSURE FORM

I. IDENTIFICATION **IPD Case #:** 50P3954

1. Short Descriptive Title of the Invention:

Method for Authenticating the Location of Content Players

2. Name of Responsible Patent Coordinator (if any):

Ana Reyes

3. Identify all persons who contributed to the present invention including persons from other Sony Divisions, Sony Japan and Outside Companies. Final determination of inventorship is a legal question which will be resolved at a later time.

(1) Full Legal Name:		Brant L. Candelore
Home Address:	Home:	10124 Quail Glen Way Escondido, CA 92029-6502
Citizenship:		U.S.A.
Business Phone/Fax:		(858) 942 – 5776 / 942 - 9207
Division/Company/Location:		DMA
Manager's Name / Phone No.:		Henry Derovanessian / Ext. 22790

Business:
16450 West
Bernardo Drive
Building 7
San Diego
92127-1804

(Add names as necessary)

II. BACKGROUND INFORMATION

1. Do you believe this invention was developed while working under or in the performance of experimental, developmental or research work called for by a Government Contract or upon the understanding that a Government Contract would be awarded? [X]NO [ ]YES

2. Has your invention been disclosed to anyone outside of Sony in a speech, exhibit, presentation, product, product manual, report, lecture, trade show, technical article, publication or otherwise? [X]NO [ ]YES

3. Is this invention related to any previous Sony Invention Disclosures of which you are aware (made by you or someone else)? [X]NO []YES

4. If you responded "YES" to any of questions 1-3, please explain below:

5. Name of product(s) or project(s) for which this invention was developed:

6. When do you expect a product incorporating this invention to be sold, offered for sale or shown to someone outside of Sony? (If a product or prototype has already been sold, offered for sale or shown, please identify the earliest date this happened.): **UNKNOWN**

Sony Player for Digital Cinema, Sony Projector Equipment

7. Has a working model of the invention been built and tested (or appropriate software been written)?
[X]NO [ ]YES If yes, who has witnessed a demonstration, and when?

8. List below any patents, publications, articles, texts, products, etc. which describe technology similar to your invention including reference material which may be useful in understanding the background technology of your invention: Include a copy of each item to IPD. Please include copies of all bibliographical information.)

Signature of Submitter(s): _____ **Date:** [redacted]

Read and understood by: _____ **Date:** _____

[redacted]

III. DESCRIPTION OF THE INVENTION

Provide a complete technical description of your invention including the following items where possible. You may attach documentation in the form of letters, memos, engineering notebook pages, etc. if available, or you may use as many invention disclosure data sheets as necessary. Be sure each page is signed, dated and witnessed.

1. **Explain the problems, issues or needs which led to the invention, and explain how others have addressed these problems, issues or needs?**

BACKGROUND

Problems with Cinematic Movie Releases

As of this writing, the SMPTE group is looking at electronic distribution to movie theatres across the world. Instead of sending reels of celluloid tape out to theatres, movies would be send digitally through various distribution modes: DBS, WWW, Cable, etc. ...

Content Providers are concerned with movie release dates phased throughout the world. The US typically gets movie releases first while the rest of the world gets them later. They don't want a movie that was intended for a US movie release to be shown in other parts of the world ahead of their intended schedule.

Problem #1: Movies can be sent outside their intended viewing area and played ahead of the scheduled release.

Problems with Miss-appropriation of a Consumer Signal for Commercial Application

A home customer typically pays a lot less than a commercial customer. The commercial customer typically pays according to the fire occupancy limit of the establishment.

In some instances, no regular commercial establishments are authorized for a particular program or pay-per-view event. This may be due to the fact that there are alternate viewing locations, e.g. auditorium or arenas, where the content may be viewed. If a regular commercial establishment could show a pay-per-view event that it would not ordinarily be able to get, then it might place itself in a more competitive position. It might not only gain the loyalty of its customers, but it could also be very lucrative – it could charge for the event and sell food – beverages and meals.

Consequently, there may a tremendous financial incentive for a commercial customer to cheat

and use a receiver/decoder, authorized for a home, in a commercial establishment.

Summary Problem #2: A player that has been authorized for a home viewing, may be taken to a commercial establishment, e.g. a restaurant, bar or tavern.

Problems with Enforcing Black-outs

A satellite STB may be taken out of its registered area, to either a home or commercial establishment in order to avoid a sports blackout.

If no other commercial establishments are able to show the program in a particular area, then the establishment that can may gain a commercial advantage.

Summary Problem #3: A player that has been authorized for viewing in a different area, may be taken out of area to avoid a sports blackout.

Problems with Gray Market Decoders

Canadian and Mexican customers often purchase a satellite service, DirecTV or EchoStar, intended only for US customers. The customers in those areas often cannot get the programming from a company in the host country. However, the Service Providers, DirecTV or EchoStar, do not have the copyrights to sell into those markets.

In recent years, Canadians have been able to purchase satellite service from Express View. But that service is not as compelling as DirecTV or EchoStar.

Summary Problem #4: A player that has been authorized for US viewing may be taken to Canada or Mexico.

2. **Best Mode: Describe any and all preferences you personally have regarding how to best implement, build, produce, or use your invention (e.g. preferred parts, materials, techniques, etc. which you feel are best in practicing your invention). Each submitter's opinion is important here, even if there is disagreement. Please list anything you think will make the invention better in any way.**

GPS – Authenticates Location

A GPS receiver may be used to authenticate the location of the receiver/player.

A GPS signal must be obtained within a particular time window. If the location conforms to certain criteria and the receiver/player is otherwise authorized, the content will be descrambled.

DBS as well as terrestrial and cable receiver/players, e.g. set top boxes, are typically receiving signals in a large broadcast area. The signal is received in commercial as well as residential

[redacted]

establishments. Blacked out areas as well as non-blacked out areas receive the same signal. Consequently, it may not be possible to restrict a signal in certain geographical locations. It therefore for the receiver/player to decide whether it should be allowed to decode a particular program.

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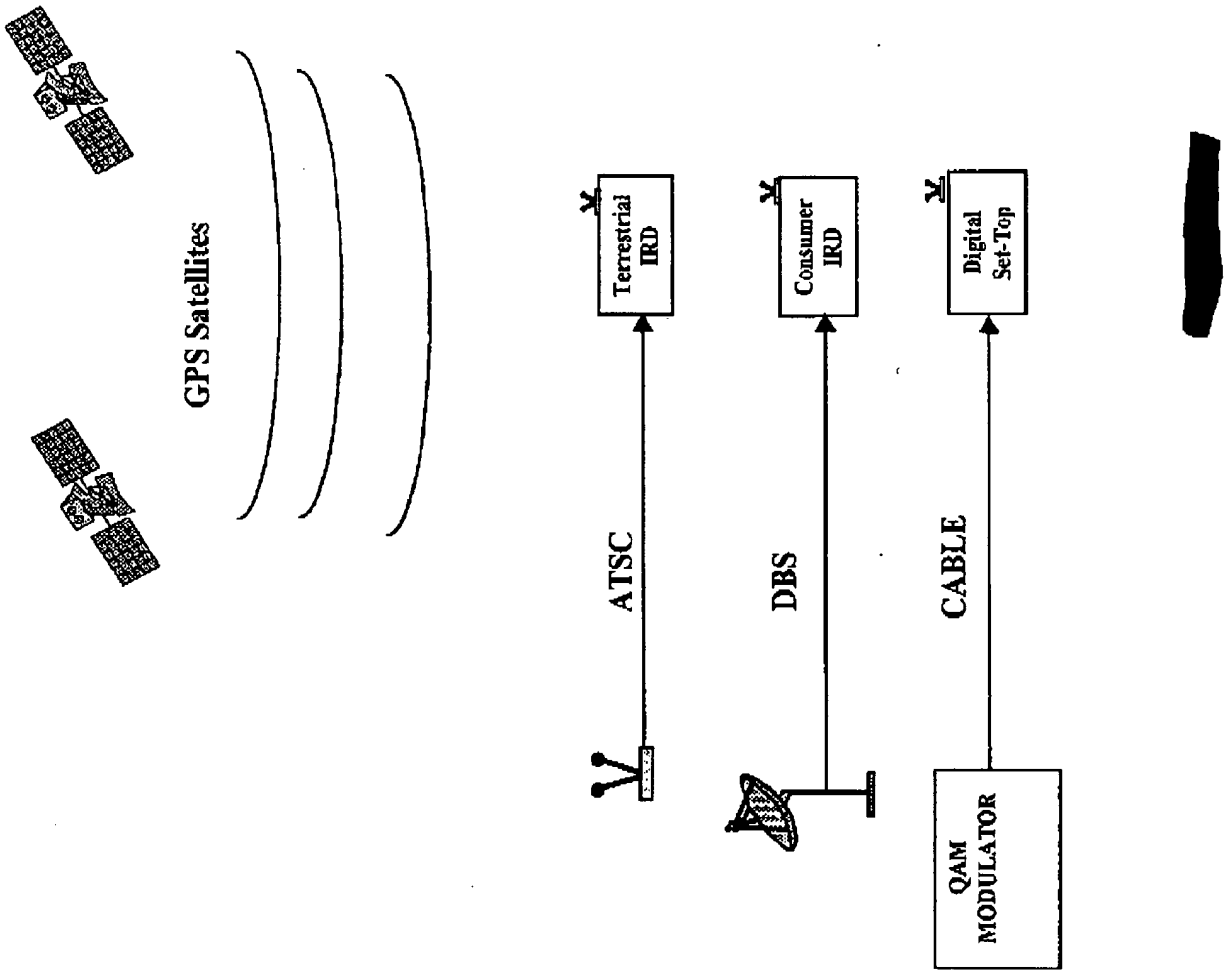

Receiver / Player - Digital Set Top Box
(GPS receiver is separate Module in Box)

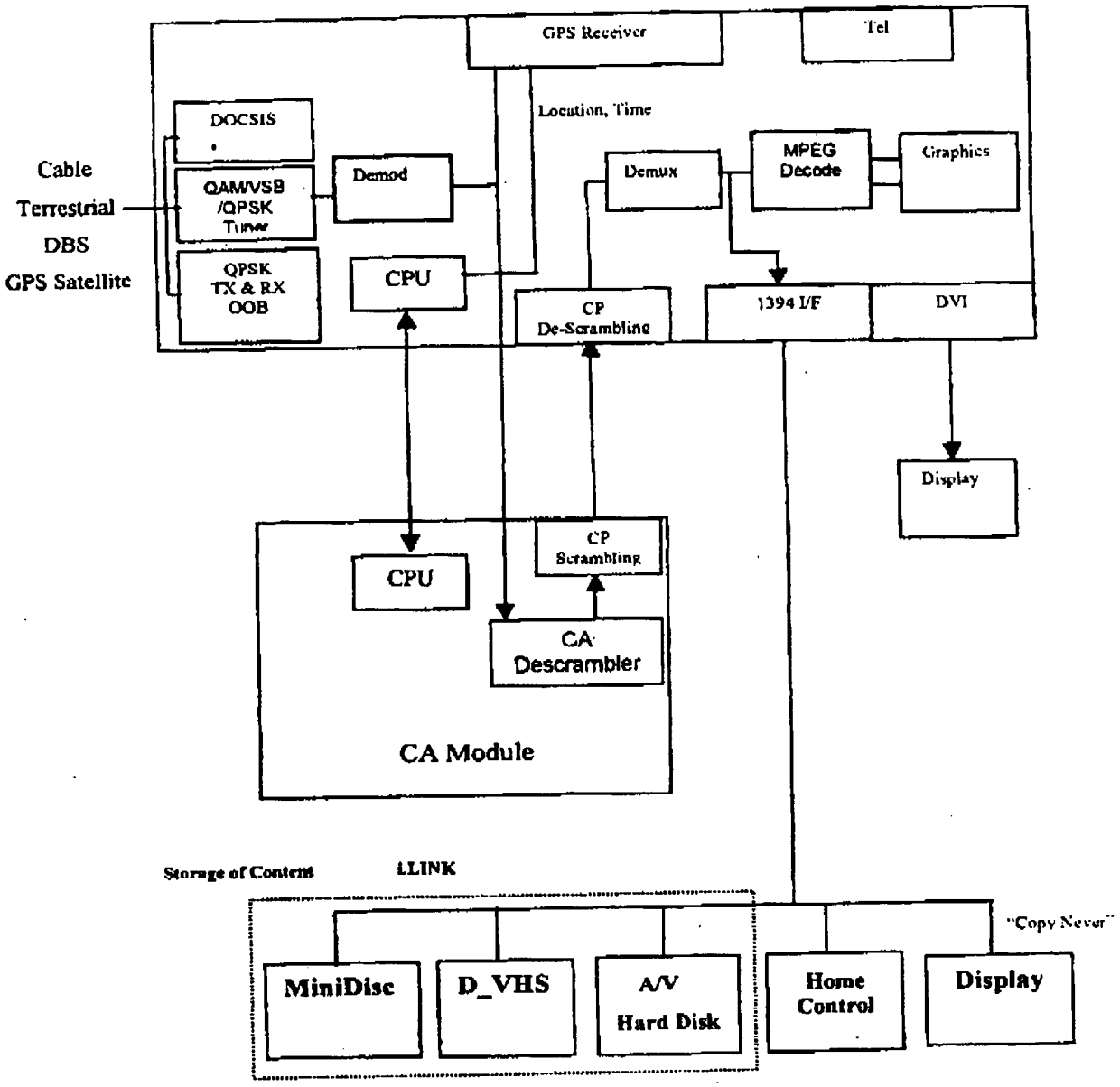

Figure 1: Typical Host

Typically there is a cryptographic processor in the receiver/player which processes entitlements and access criteria to determine whether or not to grant access and descramble content. The cryptographic processor is usually housed in one IC, e.g. smart card IC.

Ideally the GPS circuitry could be embedded in the cryptographic IC. Analog devices is about to launch the NAV-2300, a single chip solution, which includes a DSP and on-chip SRAM and I/O peripherals. All that is required is an RF front end and GPS antenna. The NAV-2300 could be built into a cryptographic processor. The cryptographic processor could also contain a real-time clock in order to authenticate time as well as location. Location could be used alone.

However, if a separate GPS module were used, then it would ideally output a cryptographically signed information. The information would include location and time. That information would be sent to the crytographic processor, and used in the authorization process. Later, with increased integration, the GPS circuit would be integral to the cryptographic IC.

Message from GPS Module to Crypto Processor:

LOCATION	TIME	SIGNATURE

A cryptographic processor and signed GPS information is not absolutely required although the security of the system would be better if they were used. In a receiver/player that uses a CA module such as POD, NRSS-B, or Common Interface module (used in Europe), the GPS module would interface with the host CPU, which would in turn pass the information to the CA module.

If the CA module were to include a GPS function, it would receive the signals over the CA interface. For example, the OOB pins could be used to send the GPS signals. The host could switch signals during the authorization process so that the CA module could verify location. The scheme may also work with embedded CA with the included GPS function.

Access criteria can be "positive" - granting access at specific locations (for example for a VOD program). The content can be specific to a particular receiver/decoder that is supposed to be at a particular location.

Access criteria be "negative" – granting access if not at specific locations. If the receiver/player is not in certain locations, then the content can be decoded. The list can be relatively long and it could be delivered separately in-band with the content.

Conclusion:

A GPS location function could make sure that a receiver/player only descrambled content in authorized locations.

3. **Briefly describe any alternate uses, variations or modifications of your invention which you contemplate.**

4. **Describe the construction and operation of the invention including drawings (flow charts, schematics, block diagrams, mechanical drawings, photographs, etc.).**

Analog Devices Specification Sheet on NAV-2100 Family of GPS Chips

Features

- Single Frequency Standard Positioning Service (SPS)
- Twelve Parallel Channels
- DSP-based programmable solution
- Computes user's position, velocity and time
- Efficient algorithms for very low Time to First Fix (TTFF) even without almanac
- Soft solution approach for correlation
- Easy upgradability and expandability
- TTL output through serial link
- Designed for easy customization
- Based on either one or two fixed-point Digital Signal Processors (DSP) with on-chip SRAM and integrated I/O peripherals support
- Two implementations with four form factors facilitate design
- Spare processing power for additional features and integrated applications
- Carrier-aided tracking
- Supports 47 geodetic data

- NMEA-0183-compatible message format for host communication
- Custom binary message format for host communication developed by Accord Software & Systems Pvt. Ltd.
- Real-time executive based software architecture
- DGPS compatibility

NAV-2100

The NAV-2100 is a 12-channel Global Positioning System Receiver (GPSR) chipset reference design. It is designed around a programmable platform - two Analog Devices' ADSST-NAV-2100 fixed- point Digital Signal Processors with on-chip SRAM and integrated I/O peripherals support. The NAV-2100 together with a standard RF front end and GPS antenna forms a complete GPS receiver. NAV-2100 chipset consists of the following:

- ADSST-NAV-2100
- Software License

Chip specifications:

- Power Supply Voltage - +5V and +3.3V
- Board dimensions - 70mm x 50mm x 12mm

NAV-2100 GPS Receiver Solution Board

NAV-2100 GPS Evaluation Kit

The evaluation kit is an easy way to become familiar with the different features of the NAV-2100 chipset.

The evaluation kit consists of:

1. NAV-2100 GPS receiver unit consisting of:
   i. NAV-2100 GPS receiver board
   ii. Motherboard
   iii. Connectors and LED
   iv. Metallic enclosure
2. Antenna with antenna cable
3. RS-232 cable and power cable
4. GVISION, PC-based user interface software on a 3½" disk (provides information such as user position, velocity, heading, waypoint navigation in text and graphic form).
5. NAV-2100 User's Guide

Following are the different elements that comprise the NAV-2100 GPS Evaluation Kit.

[redacted]

NAV-2100 GPS receiver board: The NAV-2100 GPS receiver is the top board in the receiver unit. The receiver chipset comprises a footprint of 70 mm x 50 mm x 12 mm, which is smaller than a credit card. A dual in-line male connector interfaces at TTL levels.

Motherboard: The motherboard is the bottom board of the NAV-2100 GPS Evaluation Kit. This board supplies the various power supply voltages required for the operation of the GPS receiver. It is tolerant to a wide range of input voltages ranging from 9 to 45 volts. It also provides a serial interface to the PC via a standard RS-232 driver.

Connectors and LED: The NAV-2100 GPS receiver unit has three connectors on its front panel. The power connector is a 3-pin male socket for 12 volt input from a standard car battery or any other source. The RS-232 connector is a bi-directional interface between the GPS receiver unit and any host system like the PC. In addition to the serial communication, the connector can also receive the RTCM corrections on a separate line. The antenna connector is a SMB type receptacle to receive the satellite signals from the antenna. The LED indicates the functioning of GPS receiver.

Metallic enclosure: The enclosure ensures that no stray interference signal affects the performance of the GPS receiver board. The enclosure and the receiver board share a common ground.

Antenna with antenna cable: The antenna supplied is an active patch antenna with a magnetic base and built-in cable. The built-in feature decreases the number of joints in the signal path, minimizing loss. The cable is of adequate length (3-meters) for ease of routing. The SMB end of the cable fits into the mating connector on the NAV-2100 GPS receiver unit.

RS-232 cable and Power cable: The RS-232 cable is a 9-pin cable with D-type connectors at both ends in a null modem configuration. In addition, a separate line is reserved for the RTCM data for DGPS. The Power cable has a cigarette lighter connector at one end and a female 3-pin connector at the other end. Both cables are 3-meters long, which is considered adequate for most configurations.

GVISION: This is PC-based user interface software, which enables the user to configure the receiver and monitor the messages to/from the receiver. GVISION provides information such as user position, speed, heading and other GPS parameters It also provides a data logging command, which facilitates capturing data (binary and NMEA) output from the receiver into files for post processing and analysis. The graphic screen of GVISION provides a clear trace of the route covered by the receiver on field test. Waypoints can be set to aid in waypoint navigation.

NAV-2100 User's Guide: The User's Guide gives a complete description of the NAV-2100 GPS receiver operation. A Quick start guide provides the user with most elementary steps to be followed in order to use the receiver. A comprehensive description of GVISION is also included. The input - output message structure for all binary and NMEA messages will aid the user to transmit - receive commands and data

from software's other than GVISION.

NAV-2100A

The NAV-2100A is a +3.3 V version, which includes a real-time clock and is packaged in a smaller form factor compatible with the Ashtech G8.

Chip specifications:

- Power Supply Voltage - +3.3V
- Board dimensions - 60mm x 40mm x 12mm

NAV-2100R

The NAV-2100R is a +5 V version, which includes a real-time clock and is packaged in a narrower form factor compatible with Rockwell Jupiter and SiRF products.

Chip specifications:

- Power Supply Voltage - +5V
- Board dimensions - 71mm x 41mm x 12mm

NAV-2300 Preliminary Information

The NAV-2300 is a low-power version, packaged in a smaller form factor, implemented with a single DSP. It is designed around a high performance programmable platform - the Analog Devices ADSST-NAV-2300 fixed-point Digital Signal Processor with on-chip SRAM and integrated I/O peripherals support. The NAV-2300 together with a standard RF front end and GPS antenna forms a complete GPS receiver

The NAV-2300 version consists of the following:

- ADSST-NAV-2300
- Software License

The NAV-2300 reference design includes a real-time clock.

Chip Specifications:

- Power Supply Voltage - +3.3V
- Power Consumption - 0.6 watt
- Board dimensions - 50mm x 40mm x 12mm

NAV-2300R Preliminary Information

The NAV-2100R is a +5 V version, which includes a real-time clock and is packaged in a narrower form factor compatible with Rockwell Jupiter and SiRF products.

Chip specifications:

Power Supply Voltage - +5V

Power Consumption - 0.6 watt

- Board dimensions - 71mm x 41mm x 12mm

Time to First Fix (TTFF)	
Warm Start: (with almanac, position and time estimate)	40 seconds (typical)
Cold Start: (without almanac, time, position)	60 seconds (typical)
Position Accuracy (Horizontal)	20 meters (1 without S/A)
Velocity Accuracy	0.1 meters/sec (1 without S/A)
Dynamics	
Velocity	600 m/sec
Acceleration	4 g
Jerk	7 m/sec3
Reacquisition	
Signal	Less than 1 second with a blockage time of up to 180 seconds
Position	1 second
Satellite Data Collection	2 to 11 seconds for synchronization Continuous data collection and parity checking on all twelve channels
Position Solution	2D/3D position, velocity and time 47 geodetic datum supported (default WGS84)
Position Update Rate	1 second

Environmental Characteristics

Operational Temperature Range (Ambient)	-45°C to +85°C
Storage Temperature Range	-65°C to +150°C
Humidity	95% non-condensing
	+30°C to +60°C
Altitude	-1,000 to +18,000 meters

PC/Host Communication

Interface	Serial TTL output
Baud Rate	9600 baud
Message Formats	NMEA0183 Ver 2.00, ASCII, as well as Accord's proprietary binary

Output Messages

Binary
User's present position in terms of Latitude, Longitude, Altitude, ECEF coordinates, Speed, Heading, Time, DOP, Receiver status, Satellite data, Error messages, Almanac.

NMEA
$GPGGA, $GPGSA, $GPRMC $GPGSV, $GPGLL, $GPZDA, $GPVTG

Input Messages (Binary)

Force satellite reselection, Factory reset, Almanac, Position, Time, Date and Geodetic datum, Message Control and Configuration, DGPS parameters, Receiver startup mode, DOP and visibility settings

Application Interface (Optional)

The Real Time Executive of the NAV-2100 GPS chipset provides a programmable interface to integrate OEM application software

Ordering Information

The NAV2K™ GPS Receiver Design Kit is available under part number ADSST-NAV2K™ from Analog Devices, Inc.

Analog Devices, Inc., together with Accord Software & Systems Pvt. Ltd., is developing the most advanced system receiver solutions today. Accord is based in Bangalore, India.

Invention Disclosure Data Sheet

Signature of Submitter(s): Brent Cardelore **Date:** [redacted]

Signature of Submitter(s): _____ **Date:** _____

Read and understood by: _____ **Date:** _____

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